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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/541,243	01/17/2006	William Kung	274670USPCT	7797

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EXAMINER	
HU, RUI MENG	

ART UNIT	PAPER NUMBER
2618	

DATE MAILED: 12/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/541,243	KUNG ET AL.	
	Examiner	Art Unit	
	RuiMeng Hu	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/30/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 12/30/2005 has been considered by the examiner and made of record in the application file.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. **Claims 1-5, 7, 11-16, 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Manku et al. (US Patent 7046980)** in view of **Abdelgany et al. (US Patent 6584090)**.

Consider **claim 1**, Manku et al. clearly disclose a circuit for modulating an input signal x(t) to an output signal y(t) (*figure 3*), said circuit comprising: a first mixer (*figure 3, M1*) having an input for an RF signal, an input for a first mixing signal f1 (*figure 3, output of 76*) and an output for a mixed signal based on said two input signals; a Second mixer (M2) having an input for an RF signal, an input for a second mixing signal f2 (*output of 78*) and an output (*output of M2*) for a mixed signal based on said two input signals, said output providing said output signal y(t), and said output of said first mixer being connected to said RF input of said second mixer (*figure 3*); a first signal generator, for generating a multi-tonal mixing signal $\phi 1$ and providing said first mixing signal to said first mixer; a second signal generator, for generating a mono-tonal mixing signal $\phi 2$ and providing said second mixing signal to said second mixer (*figures 3, 6-11, column 2 lines 40-42*); and a control circuit having multi-modes (*figures 3, 12, column 11 lines 49-58*): a mode in which said switch is positioned to feed said input signal x(t) to said first mixer (*figure 3, M1, as heterodyne conversion*), and said first and second signal generators are controlled to generated virtual local oscillator signal pair where $\phi 1$

* $\phi 2$ has significant power at the frequency of a local oscillator signal being emulated' and neither of said $\phi 1$ nor said $\phi 2$ having significant power at the frequency of said input signal x(t) or said LO signal being emulated (*figure 3, column 4 lines 61-67*).

However Manku et al. fail to disclose a switch having one input and two outputs, said input for receiving said input signal x(t) and said two outputs being connected to separate ones of said RF signal inputs of said first mixer and said second mixer, whereby said switch can be selectively controlled to direct said input signal x(t) to the input of either said first mixer or said second mixer; and a control circuit for controlling the position of said switch and the signals generated by said first signal generator and said second generator, said control circuit having two modes: a first mode in which said switch is positioned to feed said input signal x(t) to said second mixer, and said second signal generator is operable to generate a direct-conversion type oscillator signal.

In the same field of endeavor, Abdelgany et al. clearly disclose (*figures 3, 6, column 15 lines 28-43)* a transceiver having switch means to deliver multi-mode down-conversion and multi-mode up-conversion such as switching between heterodyne (*two-step frequency conversion*) and homodyne (*direct conversion, one-step frequency conversion*) receiving modes.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Abdelgany et al. into the art of Manku et al. as to provide a multi-mode transceiver for increasing its diversity, comprising a switch having one input and two outputs, said input

for receiving said input signal x(t) and said two outputs being connected to separate ones of said RF signal inputs of said first mixer and said second mixer, whereby said switch can be selectively controlled to direct said input signal x(t) to the input of either said first mixer (*for heterodyne conversion*) or said second mixer (*for homodyne conversion*); and a control circuit for controlling the position of said switch and the signals generated by said first signal generator and said second generator, said control circuit having two modes: a first mode in which said switch is positioned to feed said input signal x(t) to said second mixer (*as bypass said first mixer to achieve homodyne conversion*), and said second signal generator is operable to generate a direct-conversion type oscillator signal (*as homodyne conversion*); a second mode in which said switch is positioned to feed said input signal x(t) to said first mixer (*Manku et al. figure 3, as heterodyne conversion*).

Consider **claim 2 as applied to claim 1 above**, Manku et al. as modified by Abdelgany et al. clearly disclose a variable gain amplifier after said second mixer (*figure 1, 40 or 42*).

Consider **claim 3 as applied to claim 1 above**, Manku et al. as modified by Abdelgany et al. clearly disclose a variable gain amplifier after said first mixer (*figure 2, 40 or 42*).

Consider **claim 4 as applied to claim 1 above**, Manku et al. as modified by Abdelgany et al. clearly disclose an amplifier prior to said switch (*figure 1, LNA 22, as to pre-amplify a received signal*).

Consider **claim 5 as applied to claim 1 above**, Manku et al. as modified by Abdelgany et al. clearly disclose an amplifier after said second mixer (*figure 1, 40 or 42*).

Consider **claim 7 as applied to claim 1 above**, Manku et al. as modified by Abdelgany et al. clearly disclose a transmitter (*Abstract, column 5 lines 46-48, such circuit could be used in receivers and transmitters*) comprising: two modulation channels (*figure 5*), a first channel for modulating an in-phase input signal, and a second channel for modulating a quadrature input signal (*figure 5*); and a summer to combine the outputs of said first channel and said second channel (*in a transmitter, as a RF output, inherently the I and Q channels should be combined*).

Consider **claim 11**, Manku et al. clearly disclose a circuit for modulating an input signal x(t) to an output signal y(t) (*figure 3*), said circuit comprising: a first mixer (*figure 3, M1*) having an input for an RF signal, an input for a first mixing signal f1 (*figure 3, output of 76*) and an output for a mixed signal based on said two input signals; a Second mixer (*M2*) having an input for an RF signal, an input for a second mixing signal f2 (*output of 78*) and an output (*output of M2*) for a mixed signal based on said two input signals, said output providing said output signal y(t), and said output of said first mixer being connected to said RF input of said second mixer (*figure 3*); a first signal generator, for generating a multi-tonal mixing signal $\phi 1$ or a constant value signal, and providing said first mixing signal to said first mixer; a second signal generator, for generating a mono-tonal mixing signal $\phi 2$ and providing said second mixing signal to said second mixer (*figures 3, 6-11, column 2 lines 40-42*); and a control circuit having

multi-modes (*figures 3, 12, column 11 lines 49-58*): a mode in which said first and second signal generators are controlled to generated virtual local oscillator signal pair where $\phi 1 * \phi 2$ has significant power at the frequency of a local oscillator signal being emulated, and neither of said $\phi 1$ nor said $\phi 2$ having significant power at the frequency of said input signal x(t) or said LO signal being emulated (*figure 3, column 4 lines 61-67*).

However Manku et al. fail to disclose said control circuit having two modes: a first mode in which said first signal generator is controlled to generate a constant value signal, and said second signal generator is controlled to generate a direct-conversion type oscillator signal.

In the same field of endeavor, Abdelgany et al. clearly disclose (*figures 3, 6, column 15 lines 28-43)* a transceiver having switch means to deliver multi-mode down-conversion and multi-mode up-conversion such as switching between heterodyne (*two-step frequency conversion*) and homodyne (*direct conversion, one-step frequency conversion*) receiving modes.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Abdelgany et al. into the art of Manku et al. as to provide a multi-mode transceiver for increasing its diversity, comprising a control circuit having two modes: a first mode in which said first signal generator is controlled to generate a constant value signal (*to make the first mixer as being passive to achieve homodyne conversion*), and said second signal generator is controlled to generate a direct-conversion type oscillator

signal (*as homodyne conversion*); and a second mode (*Manku et al. figure 3, as heterodyne conversion*).

Consider **claim 12 as applied to claim 11 above**, Manku et al. as modified by Abdelgany et al. clearly disclose a filter (*figure 1, BPF 28*); and a switch which is operable to selectively place said filter inline between said first and said second mixers; said switch being controlled by said control circuit (*considering in heterodyne conversion, BPF 28 is preferred to be placed between two mixers as being a channel filter (column 2 lines 43-46), considering in homodyne conversion, BPF 28 is switched off as being unnecessary in direct conversion mode*).

Consider **claim 13 as applied to claim 11 above**, Manku et al. as modified by Abdelgany et al. clearly disclose a variable gain amplifier after said second mixer (*figure 1, 40 or 42*).

Consider **claim 14 as applied to claim 11 above**, Manku et al. as modified by Abdelgany et al. clearly disclose a variable gain amplifier after said first mixer (*figure 2, 40 or 42*).

Consider **claim 15 as applied to claim 11 above**, Manku et al. as modified by Abdelgany et al. clearly disclose an amplifier prior to said first mixer (*figure 2, LNA 22*).

Consider **claim 16 as applied to claim 11 above**, Manku et al. as modified by Abdelgany et al. clearly disclose an amplifier after said second mixer (*figure 1, 40 or 42*).

Consider **claim 18 as applied to claim 11 above**, Manku et al. as modified by Abdelgany et al. clearly disclose a transmitter (*Abstract, column 5 lines 46-48, such*

circuit could be used in receivers and transmitters) comprising: two modulation channels (*figure 5*), a first channel for modulating an in-phase input signal, and a second channel for modulating a quadrature input signal (*figure 5*); and a summer to combine the outputs of said first channel and said second channel (*in a transmitter, as a RF output, inherently the I and Q channels should be combined*).

Claims 6, 8-10, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Manku et al. (US Patent 7046980)** as modified by **Abdelgany et al. (US Patent 6584090)** in view of **Sahota et al. (US Patent 6615027).**

Consider **claim 6 as applied to claim 1 above**, **claim 10 as applied to claim 7 above, claim 17 as applied to claim 11 above** Manku et al. as modified by Abdelgany et al. fail to disclose each of said amplifiers and each of said mixers is a differential device.

In the same field of endeavor, Sahota et al. clearly disclose a circuit comprising differential amplifiers and differential mixers (figure 5, column 8 lines 12-18, column 10 lines 10-21).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Sahota et al. into the art of Manku et al. as modified by Abdelgany et al. as to provide differential amplifiers and differential mixers to enhance the signal quality.

Consider **claim 8 as applied to claim 7 above**, **claim 9 as applied to claim 7 above** Manku et al. as modified by Abdelgany et al. fail to disclose a variable gain amplifier after said summer; and an amplifier after said summer.

In the same field of endeavor, Sahota et al. clearly disclose a transmitter comprising a variable gain amplifier (*figure 1, VGA 146*); and an amplifier (figure 1, PA 150) after a summer (*figure 1, modulator 124*).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Sahota et al. into the art of Manku et al. as modified by Abdelgany et al. as to provide sufficient amplifiers to the transmitter for transmitting the RF signal successfully.

Conclusion

7. Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to:**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RuiMeng Hu whose telephone number is 571-270-1105. The examiner can normally be reached on Monday - Thursday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edan Orgad can be reached on 571-272-7884. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RuiMeng Hu
R.H./rh
November 21, 2006

EDAN ORGAD
PATENT EXAMINER/TELECOMM.

11/26/06